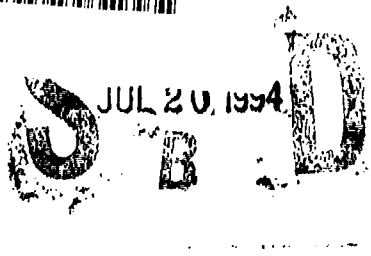
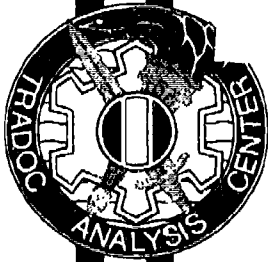


AD-A281 878

Technical Report TRAC-TR-0494
March 1994



BRIGADE PREPOSITIONED (PREPO) AFLOAT OPERATIONS STUDY

FINAL REPORT

94-22574



DISTRIBUTION STATEMENT A

Approved for public release /
Distribution Unlimited

TRADOC Analysis Center
Study and Analysis Center
Study Directorate
Fort Leavenworth, Kansas 66027-5200

DTIC QUALITY INSPECTED 1

94 7 19 058


TRADOC Analysis Center-Study and Analysis Center
Study Directorate
Fort Leavenworth, Kansas 66027-5200

BRIGADE PREPOSITIONED (PREPO) AFLOAT OPERATIONS STUDY


by

Lynn Swezy
Major Peter Itao


PREPARED BY:


DONALD W. KROENING
Director, Study Directorate
TRAC-SAC

CERTIFIED BY:


ALLAN M. RESNICK
COL, FA
Director, TRAC-SAC

APPROVED BY:


LARRY G. LEHOWICZ
MG, USA
DCSCD, TRADOC

Distribution Statement:
Approved for public release;
distribution is unlimited.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
<small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (8704-0188), Washington, DC 20503.</small>				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 1994		3. REPORT TYPE AND DATES COVERED Technical Report; Jan 94-Mar 94
4. TITLE AND SUBTITLE Brigade Prepositioned (PREPO) Afloat Operations Study; Final Report			5. FUNDING NUMBERS	
6. AUTHOR(S) Lynn Swezy; MAJ Peter Itao				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Study Directorate TRADOC Analysis Center-Study & Analysis Center ATTN: ATRC-SAS Ft Leavenworth, KS 66027-5200			8. PERFORMING ORGANIZATION REPORT NUMBER Technical Report TRAC-TR-0494	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Early Entry Lethality & Survivability Battle Laboratory HQ, TRADOC ATTN: ATCD-L Ft Monroe, VA 23651			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Distribution approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This report describes the heavy brigade prepositioned (PREPO) afloat operations processes for the alert phase, deployment phase, and theater reception and onward movement phase. The report identifies the processes/tasks performed by the off-load preparation party (OPP), advance party, transportation group, and main body. It identifies the overall duration time of the operations and recommendations to reduce that time. Two situations were examined: 1) pier side off-load, and 2) in-stream off-load. A decision support system (DSS) is under development by the TRADOC Analysis Center (TRAC) to encompass the PREPO operations to allow staff planners to determine durations for various contingencies.				
14. SUBJECT TERMS PREPO; PREPO Afloat; heavy brigade PREPO; pier-side off-load; in-stream operations			15. NUMBER OF PAGES 40	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UNLIMITED	

CONTENTS

	<u>Page</u>
TITLE PAGE.....	i
SF 298, REPORT DOCUMENTATION PAGE.....	ii
TABLE OF CONTENTS.....	iii
 PREPO AFLOAT OPERATIONS STUDY	
1. Purpose.....	1
2. Background.....	1
3. Issues/essential elements of analysis (EEA).....	3
4. Scope.....	3
5. Assumptions.....	4
6. Methodology.....	5
7. Final results	7
8. Points of contact.....	20
 APPENDIXES	
A. Joint working group (JWG) members.....	A-1
B. PREPO afloat operations processes.....	B-1
C. Glossary/definitions	C-1
D. Distribution.....	D-1

Accession For	
NTIS GPARL	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A-1	

LIST OF FIGURES

	<u>Page</u>
1. Methodology.....	5
2. Description of eight PREPO ships.....	7
3. Process diagram of major tasks.....	11
4. Critical events and duration time of PREPO operations (pier side off-load)	12
5. Critical events and duration time of PREPO operations (in-stream off-load)	13
6. Bottlenecks in PREPO afloat operations (pier side off-load).....	14
7. Recommendations (pier side off-load)	15
8. Bottlenecks in PREPO afloat operations (in-stream operations).....	16
9. Recommendations (in-stream operations)	17
10. DSS functionality	19

LIST OF TABLES

1. Major tasks.....	7
B-1. Major tasks/sub-tasks.....	B-2

BRIGADE PREPOSITIONED (PREPO) AFLOAT OPERATIONS STUDY

FINAL REPORT

1. Purpose.

a. The purpose of the study was to provide a decision support system (DSS) to the warfighting commanders-in-chief (CINCs) under the sponsorship of the Early Entry Lethality and Survivability (EELS) Battle Laboratory (BL) to assist in analyzing brigade prepositioned (PREPO) afloat operations. The DSS must detail the processes and times associated with the alerting of the heavy brigade, linking the heavy brigade with the prepositioned ships, and preparing the brigade for combat. Furthermore, the study addresses ways to reduce the overall duration of the PREPO afloat operations. The emphasis in the study was on the warfighter.

b. This report identifies that process, the critical path tasks and time, recommendations to improve the process/time, and other considerations that may impact the overall operations. The DSS is under development and will be delivered to the CINCs by 30 September 1994.

2. Background.

a. The PREPO afloat operations are part of the overall plan to deploy a designated heavy brigade by contingency day (C-Day) + 15 (C+15) and two full divisions by C+30. The PREPO afloat operations deals specifically with the heavy brigade. To accomplish this feat, the heavy brigade's equipment and support elements (engineer, air defense artillery (ADA), artillery, signal, etc.) are prepositioned on eight ships stationed at Diego Garcia in the Indian Ocean and at Thailand. There are seven phases to the PREPO afloat operations as described in Field Manual (FM) 100-17-1:

(1) Planning phase. This entails deliberate, crisis, and contingency planning. Once assigned the mission of PREPO afloat forces, the brigade commander initiates the required planning processes.

(2) Alert phase. During this phase, units prepare for movement to aerial port of embarkation (APOE) and loading aboard aircraft. The Army forces dispatch the liaison officer (LO) party, the off-load preparation party (OPP), and the advance party during this phase.

(3) Deployment phase. Deployment phase begins with the departure of the first element of the main body to the APOE or when the PREPO afloat ships begin transit to a designated sea port of debarkation (SPOD). This phase ends when the last element of the main body arrives at the APOE. A critical part of deployment is the strategic lift.

(4) Theater reception and onward movement (TR/OM) phase. This phase begins with the arrival of the first ship carrying PREPO afloat equipment or the first aircraft of the main body at the designated aerial port of debarkation (APOD)/SPOD. This phase ends when equipment and supplies are off-loaded and issued to awaiting units; command, control, and communications are

established; and personnel and equipment link up and move forward to the tactical assembly area (TAA). Simultaneous or subsequent tactical operations by the joint task force (JTF) and movement to those operations are not considered part of the PREPO afloat operations.

(5) Employment phase. The heavy brigade closes on and prepares for follow-on operations. This facilitates the landing of follow-on forces.

(6) Redeployment phase. The objective of this stage is to redeploy as rapidly as possible to the continental United States (CONUS), to an intermediate staging base, or to another theater of operations. In conjunction with this effort, regeneration of combat forces will be necessary to ensure the readiness to handle other contingencies or operations in other theaters. Planning for redeployment must be initiated upon receipt of the original warning order. The supported CINC, when directed by the Chairman, Joint Chiefs of Staff (CJCS), will regenerate the PREPO afloat equipment within his theater of operations using available assets.

(7) Regeneration of equipment for PREPO afloat ships phase. Ships will be taken to a prescribed maintenance facility where personnel from the U.S. Army Materiel Command (USAMC) and the U.S. Army Medical Materiel Agency (USAMMA) will perform required maintenance or replace the equipment. This process is to be accomplished within 45 days. Equipment that cannot be repaired within the 45-day window for reloading the ship will be exchanged. The PREPO afloat ships, upon completion or regeneration, will be returned to the standard maintenance cycle developed by USAMC and USAMMA. Based on lessons learned, materiel will be stowed aboard ship in such a configuration that routine surveillance, exercising, and inspections can be performed at sea where feasible.

b. This study addressed only phases 2 through 4 for the following reasons: C-Day starts when the units depart from the home station, Phase 4 culminates with the brigade ready for combat. The EELS BL requested the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) in January 1994 to analyze the processes that occur during these phases, determine the overall duration, and develop a DSS of these processes and times. The EELS BL performed preliminary work using a project evaluation and review technique (PERT) software package to identify the processes and duration times of the PREPO afloat operations in broad terms. When EELS BL presented the PERT schematic and results to the Deputy Commander, TRADOC Combat Developments, he commented that the effort was a "great start" but that they should continue to "peel the onion" (i.e., break the processes down even further). To this end, the EELS BL asked TRAC for assistance. The intent was to break the processes down into sufficient detail that the warfighting unit could use them much like a checklist of things to do during phases 2 through 4 of the operations. Furthermore, the processes were to be incorporated into a DSS to allow the user to determine the timing of the tasks and the overall duration.

c. Many of these processes are identified in various documents and known by the associated units/organizations who must perform these processes. But, until now, the operation (phases 2 through 4) from start to finish had not been laid out to see how the individual pieces fit together. This study effort further illuminates the overall picture of the operations and the interaction among processes that must occur for the PREPO afloat operations to work efficiently and enable the heavy brigade to become combat ready by C+15.

3. Issues/essential elements of analysis (EEA). The following issues and EEA were developed by TRAC-Study and Analysis Center (TRAC-SAC) in consultation with the EELS BL.

a. Issue 1. What are the processes/tasks performed in the PREPO afloat operations in the alert phase, deployment phase, and TR/OM phase? *[Emphasis is placed on the TR/OM phase.]*

- (1) EEA 1. What sub-tasks are performed in the phases of the operation?
- (2) EEA 2. What is the sequence of sub-tasks?
- (3) EEA 3. What is the duration time of each sub-task?
- (4) EEA 4. Who performs each sub-task?

b. Issue 2. What is the duration time of the PREPO afloat operations from the alert phase through the completion of the TR/OM phase?

- (1) EEA 5. What is the overall duration of the operation?
- (2) EEA 6. What are the interim duration times by phase, performing unit, and other time groupings as identified by the user? *[The answer to this EEA will be obtainable via the DSS and is not documented in this report.]*
- (3) EEA 7. What is the critical path?

c. Issue 3. What recommendations and considerations could reduce the duration of the PREPO afloat operations?

- (1) EEA 8. What are possible ways to shorten the critical path time?
- (2) EEA 9. What are some critical factors which can impact the overall time?

d. Issue 4. What DSS concept best supports the users and what are its capabilities?

- (1) EEA 10. What is the functionality of the DSS?
- (2) EEA 11. What are the software requirements?
- (3) EEA 12. What are the hardware requirements?

4. Scope.

a. The emphasis of the study was on the warfighter. Specifically, this study addressed the processes undertaken by the heavy brigade (to include the OPP, advance party, main body, and the transportation group (Trans Grp). The OPP prepares the unit's equipment on-board ship for off-loading (e.g., preventive maintenance, checks and services). The advance party coordinates

with the Trans Grp on the location of the port staging areas. Additionally, the advance party establishes staging areas in the MA. The Trans Grp establishes port staging areas and off-loads the ships. The roles of other agencies/organizations (e.g., USAMC) were not addressed.

b. The study encompassed PREPO afloat operations from the alert phase through the TR/OM phase with emphasis on the latter.

c. Since the POD is not known and could be anywhere outside CONUS, a generic scenario was used. The DSS user will be able to change the data to reflect other PODs.

d. The study addressed two situations. The first situation is the best case using pier side off-load. The second situation is the worst case using in-stream operations which entails off-loading at sea on lighters (causeway ferries or landing craft) which maneuver to a bare beach (called logistics over the shore (LOTS)).

e. Maximum off-load capacity is determined by the minimum of either the number of terminal service companies (TSCs), number of berths available, or TSC equipment. For example, four TSCs and three berths enables three ships to be off-loaded simultaneously.

f. Other variables were addressed as considerations (e.g., sea states, number of cranes, benign port, and host-nation support) and will not be represented in the DSS.

5. Assumptions. The following assumptions were made by the EELS BL or others to simplify the analysis, thus permitting the study to accomplish its milestones.

a. C-Day is defined in the study when the main body, advance party, OPP, and Trans Grp deploy from their homestation.

b. The entire brigade consists of two mechanized (MX) and two armored battalions with brigade combat support and combat service support elements (direct support field artillery, engineer, signal, military intelligence (MI), etc.). The brigade is trained and prepared to fight as a four battalion brigade.

c. The OPP links up with the PREPO ships prior to sailing.

d. Unit-level logistics system (ULLS) boxes are prepositioned with the unit equipment. ULLS boxes allow for proper inventory of the equipment on the ship.

e. Ship steam time is six days.

f. There are at least four available berths.

g. Sea state will permit off-load. The study reflects a sea state of 1 (calm, glassy surface). (Sea states of 3 or higher stop all in-stream/off-shore operations.)

h. For in-stream operations, the ships will anchor two miles from the port.

- i. There is an adequate number and capacity of cranes to off-load PREPO ships.
- j. One TSC can off-load one ship at a time.
- k. Troup transportation will be available at sea and air PODs.
- l. Seabee ships transport causeway systems and lighters (used to conduct in-stream operations) to area of operations. Army causeway systems are currently located at Fort Eustis, VA. Navy causeway systems from a Navy maritime prepositioning ship (MPS) squadron are used to supplement Army systems. The study assumes 72 hours to prepare the Seabee ships for sailing and 15 days sail time.
- m. The host nation provides tugboats.
- n. There is a benign threat at the POD. The POD, MA, and TAA are secured by light or airborne forces.
- o. All classes of supply are issued by battalion as part of MA operations.
- p. Ships and host-nation support provide adequate fuel to start combat operations. The CINC does not await additional sustainment ships.

6. Methodology. The methodology is shown in figure 1 and described below.

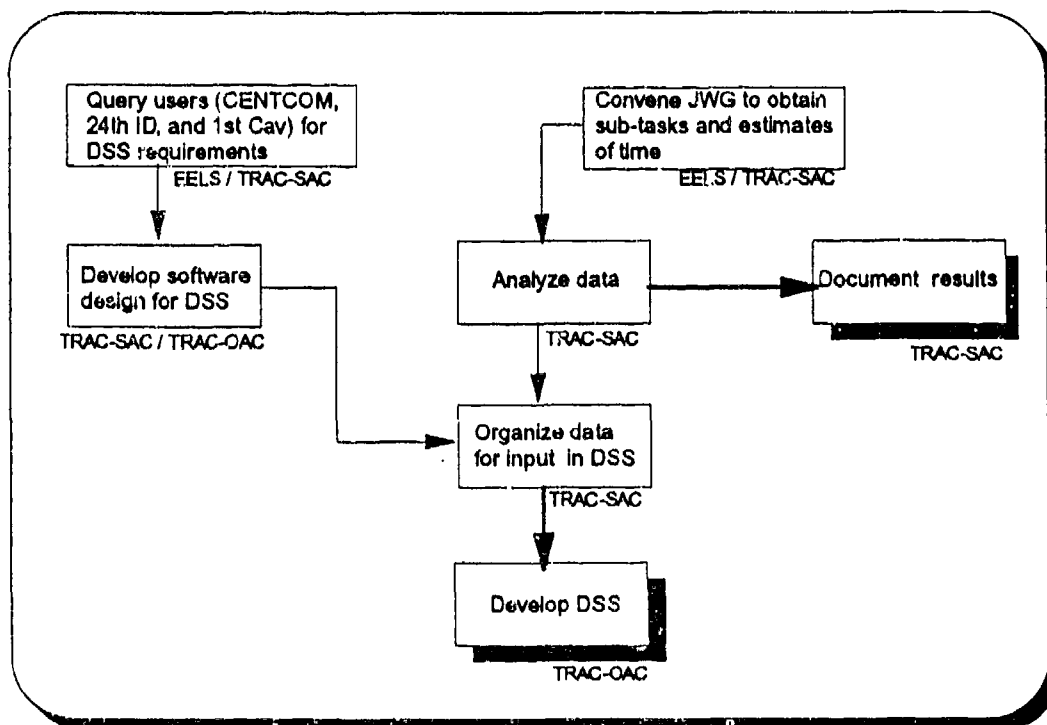


Figure 1. Methodology

a. Determine user requirements. Potential DSS users (Central Command (CENTCOM), 24th Infantry Division (ID), and 1st Cavalry Division) provided their requirements for a useful DSS. Based on these requirements, the study team developed the software design of the DSS. TRAC-Operations Analysis Center (TRAC-OAC) resources were used in developing the DSS design.

b. Convene joint working group (JWG). The EELS BL hosted a JWG of subject-matter experts (SME) to identify the processes/tasks, their sequence, times, and any insights. TRAC-SAC assisted with the JWG. The JWG members are listed at appendix A.

c. Analyze data.

(1) TRAC-SAC analyzed the data from the JWG to compute the critical path and overall duration of the operations for two possible situations. Since the DSS was not developed in the timeframe of this analysis, the TRAC-SAC study team developed an interim representation of the PREPO afloat operations processes using the data from the JWG to determine the overall duration of the two situations. The study team developed this interim representation using *Modeler*, a Petri-net modeling tool. This representation is not being considered for distribution as the DSS because it would require the user to purchase additional hardware. It was used solely to assist the study team in analyzing the data in sufficient time to document the results in this report.

(2) The two situations analyzed provided bounds for the best and worst situations. The best situation is a pier side off-load and the worst situation is off-loading all ships by in-stream operations. The transportation group (Trans Grp) sends two TSCs (part of the theater off-load force modules (TOFMs)) upon alert notification and sends the third and fourth TSCs at later dates. Each company can off-load one ship at a time. For pier side off-loading, up to three ships are off-loaded simultaneously; whereas for in-stream operations, up to four ships are off-loaded simultaneously due to the later arrival of the Seabee ships. The analysis results of these two situations are contained in this report.

d. Develop DSS. TRAC-SAC is responsible for the development of the DSS. TRAC-SAC organized the data obtained from the JWG for use in developing the DSS. The basic capabilities of the DSS are to determine the critical path and overall duration of the operations. The user will be provided the data as used in this study. However, the user will be able to change the data file to represent different contingency operations. The DSS is not complete as of the publication of this report. The DSS prototype will be provided to the EELS BL by the end May of 1994 and distributed to the CINCs for comments by early June 1994. Suggestions will be incorporated, if feasible in the timeframe, and the enhanced prototype will be delivered to the CINCs by late September 1994 with user documentation. The tool will have a robust design to accommodate further enhancements at a later date. A description of the DSS capabilities is in paragraph 7d.

7. **Final results.** The study addressed operations from the alert of the unit, the link up of the unit with the eight ships at the area of operations, and preparing the unit for combat. A description of the eight ships is shown in figure 2. The first and second ships off-loaded in pier side operations are the ships containing off-load equipment; the third, fourth, fifth, and sixth ships off-loaded are the maneuver ships. The CINC determines the order in which to off-load these maneuver ships depending whether he wants the MX or armored equipment on the ground first. The seventh ship off-loaded carries additional support and sustainment equipment beyond the basic load of three days supply. The purpose of this ship is to provide resupply to the PREPO brigade.

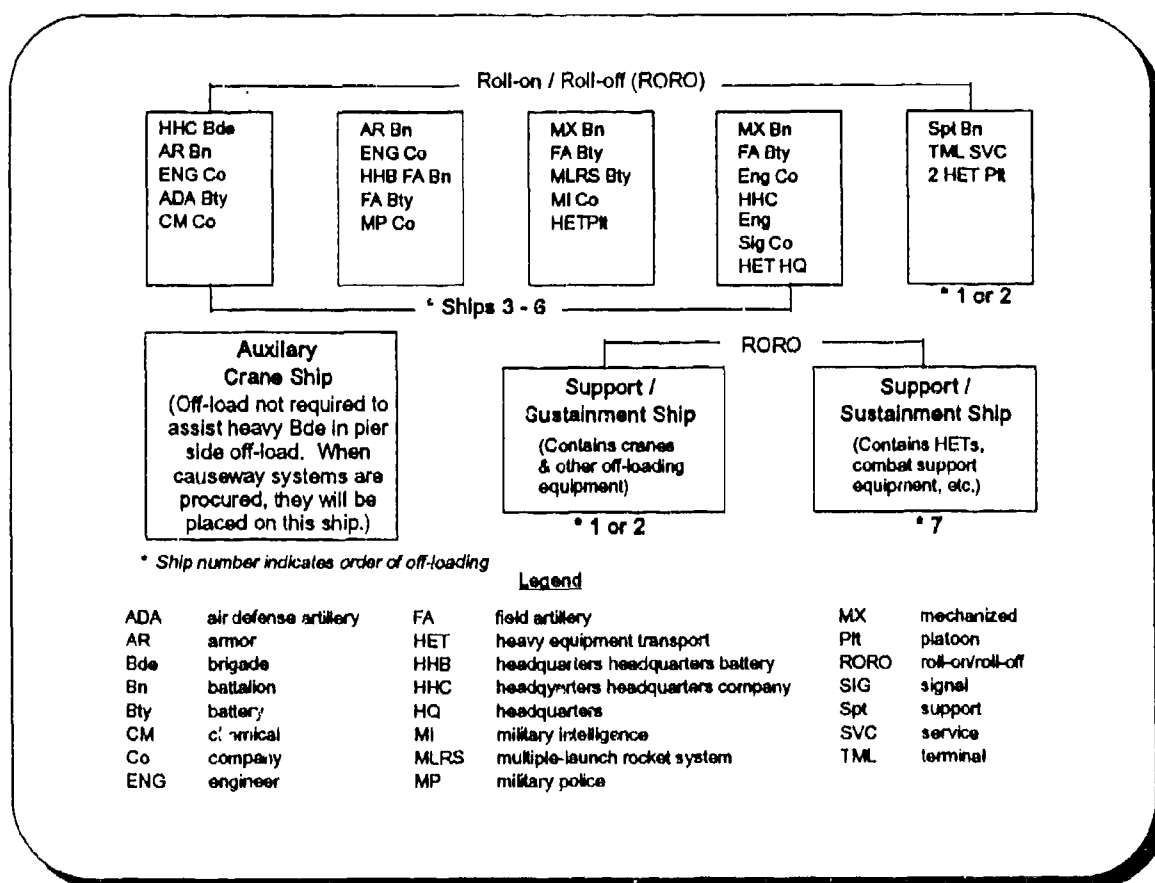


Figure 2. Description of eight PREPO ships

a. *Issue 1.* EEAs 1 through 4 are answered in table 1 and appendix B.

(1) Table 1 identifies the major tasks of the PREPO afloat operations from the alert phase through the TR/OM phase, their sequencing, duration, and who performs the task. These major tasks were first identified by the EELS BL prior to TRAC involvement in the study. The JWG concurred with these major tasks with a few minor changes. Table 1 contains the major tasks as verified by the JWG. The major tasks as they were split into sub-tasks are contained in table B-1 at appendix B.

Table 1. Major tasks

TASK #	MAJOR TASK	DURATION in hours (hrs)	PREDECESSOR TASKS
1	UNITS RECEIVE ALERT NOTIFICATION		
2	UNIT CONDUCTS RECALL OF UNIT	4 hrs	1
3	UNIT CONDUCTS SOLDIER READINESS PROCESSING	48 hrs	1
#4	TRANS GRP UP-LOAD CAUSEWAY SYSTEMS (NOT PART OF TRANS GRP DEPLOYING) (THIS TASK ONLY FOR IN-STREAM OPERATIONS)	72 hrs	3
#5	SEABEE SHIPS SAIL (CARRYING CAUSEWAY SYSTEMS) (ONLY FOR IN-STREAM OPERATIONS)	15 days	4
6	COMMANDER MARITIME PREPO SQUADRON (COMPSRON) TWO PREPARES (PREP) PREPO SHIPS FOR SEA	22 hrs	1
7	OPP PREPARE EQUIPMENT TO ACCOMPANY TROUPS/NOT AUTHORIZED PREPOSITIONING (TAT/NAP)	6 hrs	2
8	OPP CONDUCT WEIGHT/JOINT INVENTORY (JI) INSPECTION	6 hrs	7
9	ADVANCE (ADV) PARTY PREPARE TAT/NAP	6 hrs	2
10	ADV PARTY CONDUCT WEIGHT/JI INSPECTION	6 hrs	9
11	TRANS GRP PREPARE TAT/NAP	6 hrs	2
12	TRANS GRP CONDUCT WEIGHT/JI INSPECTION	6 hrs	11
13	MAIN BODY PREPARE TAT/NAP	24 hrs	2
14	MAIN BODY CONDUCT WEIGHT/JI INSPECTION	12 hrs	13
15	C-DAY	0 hrs	3, 8, 10, 12, 14
*16	OPP DEPARTS FOR APOE	0 hrs	15
*17	OPP ENROUTE TO APOE	2 hrs	16
*18	OPP ARRIVES AT APOE	0 hrs	17
*19	OPP VERIFY WEIGHT/JI INSPECTION	3 hrs	18
*20	OPP DEPARTS APOE FOR APOD	0 hrs	19
*21	OPP ENROUTE TO APOD	30 hrs	20
*22	OPP ARRIVES AT APOD	0 hrs	21
*23	OPP BOARDS PREPO SHIPS	9 hrs	22
*24	PREPO SHIP ENROUTE TO SPOD	144 hrs	6, 23
25	ADV PARTY DEPARTS FOR APOE	0 hrs	15
26	ADV PARTY ENROUTE TO APOE	2 hrs	25

Table 1. Major tasks (continued)

TASK #	MAJOR TASK	DURATION in hours (hrs)	PREDECESSOR TASKS
27	ADV PARTY ARRIVES AT APOE	0 hrs	26
28	ADV PARTY VERIFY WEIGHT/JI INSPECTION	3 hrs	27
29	ADV PARTY DEPARTS APOE FOR APOD	0 hrs	28
30	ADV PARTY ENROUTE TO APOD	30 hrs	29
31	ADV PARTY ARRIVES AT SPOD	0 hrs	30
32	TRANS GRP DEPARTS FOR APOE	0 hrs	15
33	TRANS GRP ENROUTE TO APOE	2 hrs	32
34	TRANS GRP ARRIVES AT APOE	0 hrs	33
35	TRANS GRP VERIFY WEIGHT/JI INSPECTION	3 hrs	34
36	TRANS GRP DEPARTS APOE FOR SPOD	0 hrs	35
37	TRANS GRP ENROUTE TO SPOD	30 hrs	36
38	TRANS GRP ARRIVES AT SPOD	0 hrs	37
39	MAIN BODY DEPARTS FOR APOE	0 hrs	15
40	MAIN BODY ENROUTE TO APOE (THIS ENCOMPASSES THE ELAPSED TIME FROM WHEN THE FIRST SOLDIER LEAVES TO WHEN THE LAST SOLDIER ARRIVES)	96 hrs	39
41	MAIN BODY ARRIVES AT APOE	0 hrs	40
42	MAIN BODY VERIFY WEIGHT/JI INSPECTION	6 hrs	41
43	MAIN BODY DEPARTS APOE FOR APOD	0 hrs	42
44	MAIN BODY ENROUTE TO APOD	30 hrs	43
45	MAIN BODY ARRIVES AT APOD	0 hrs	44
46	TRANS GRP ESTABLISH STAGING AREAS (SAs)	14 hrs	38
47	ADV PARTY COORDINATE SA	48 hrs	31, 38
*48	PREPO SHIPS ARRIVE AT SPOD	0 hrs	24
49	TRANS GRP BEGINS OFF-LOAD OPERATIONS (ONGOING TASK UNTIL MA OPERATIONS COMPLETE)	24 hrs	46, 47, 48
#50	SEABEE SHIPS ARRIVE (ONLY FOR IN-STREAM OPERATIONS)	0 hrs	5
#51	TRANS GRP OFF-LOADS LIGHTERAGE FROM HEAVY LIFT PREPOSITIONING SHIP (HLPS) (ONLY FOR IN-STREAM OPERATIONS; HLPS IS AN ADDITIONAL SHIP, NOT PART OF THE EIGHT)	24 hrs	46, 48
#52	TRANS GRP OFF-LOAD AND ASSEMBLE CAUSEWAY SYSTEMS (ONLY FOR IN-STREAM OPERATIONS)	48 hrs	50, 51
*53	TRANS GRP/OPP CONDUCT SHIP MEETING	1 hr	46, 48

Table 1. Major tasks (concluded)

TASK #	MAJOR TASK	DURATION in hours (hrs)	PREDECESSOR TASKS
*54	TRANS GRP/OPP BERTH/OFF-LOAD FIRST & SECOND SHIPS	36 hrs (108 hrs)	53, (if in-stream also 52)
#*55	TRANS GRP/OPP BERTH/OFF-LOAD THIRD & FOURTH SHIPS	36 hrs (108 hrs)	47, 54
56	TRANS GRP/OPP BERTH/OFF-LOAD FIFTH, SIXTH, & SEVENTH SHIPS	36 hrs (108 hrs)	55
57	TRANS GRP/OPP/ADV PARTY CONDUCT PORT CLEARANCE FOR THIRD & FOURTH SHIPS (ONGOING TASK WHILE 3RD & 4TH SHIPS ARE OFF-LOADED UNTIL LAST PIECE OF EQUIPMENT IS CLEARED FROM THE PORT)	56 hrs (128 hrs)	54
#*58	TRANS GRP/OPP/ADV PARTY CONDUCT PORT CLEARANCE FOR FIFTH, SIXTH, AND SEVENTH SHIPS	56 hrs (128 hrs)	55
59	UNIT CONDUCTS MA OPERATIONS AT SA FOR FIRST TWO ELEMENTS	82 hrs	45, 55, 57
#*60	UNIT CONDUCTS MA OPERATIONS AT SA FOR LAST TWO ELEMENTS	82 hrs	45, 49, 56, 58
61	FIRST TWO ELEMENTS MOVE TO TAA	24 hrs	59
#*62	LAST TWO ELEMENTS MOVE TO TAA	24 hrs	60
#*63	UNIT READY FOR COMBAT	0 hrs	61, 62
Times in () indicate duration for task when performing in-stream operations. * Indicates task on critical path for pier side off-load. # Indicates task on critical path for in-stream (including LOTS) operations.			

(2) A diagram of the PREPO afloat operations process by major tasks is shown in figure 3. This diagram graphically portrays the sequencing of the tasks. Tasks pertaining to the first two elements and the last two elements represent the four maneuver battalions and a field artillery (FA) battalion. The first through seventh ships identified in the table of tasks corresponds to the off-loading sequence of the ships (also annotated in figure 2). The HLPS is an additional ship (not part of the eight) which requires off-loading first during in-stream operations (task 51: **Trans Grp Off-loads Lighterage from HLPS**). The major tasks as they were further divided into sub-tasks by the JWG and input into the DSS, are at appendix B.

b. Issue 2. The following paragraphs indicate the major tasks and sub-tasks along the critical path for the two situations addressed in this study: a pier side off-load and in-stream operations. Also discussed are tasks and sub-tasks considerations and recommendations which could shorten the critical path time. Figures 4 and 5 show the critical events timeline and overall duration for the two situations.

(1) EEA 5. The PREPO operations processes used in this study commenced on C-2 with the alert notification. In the pier side off-load situation, the brigade is ready to fight on C+17. With in-stream operations, the brigade is ready to fight on C+38.

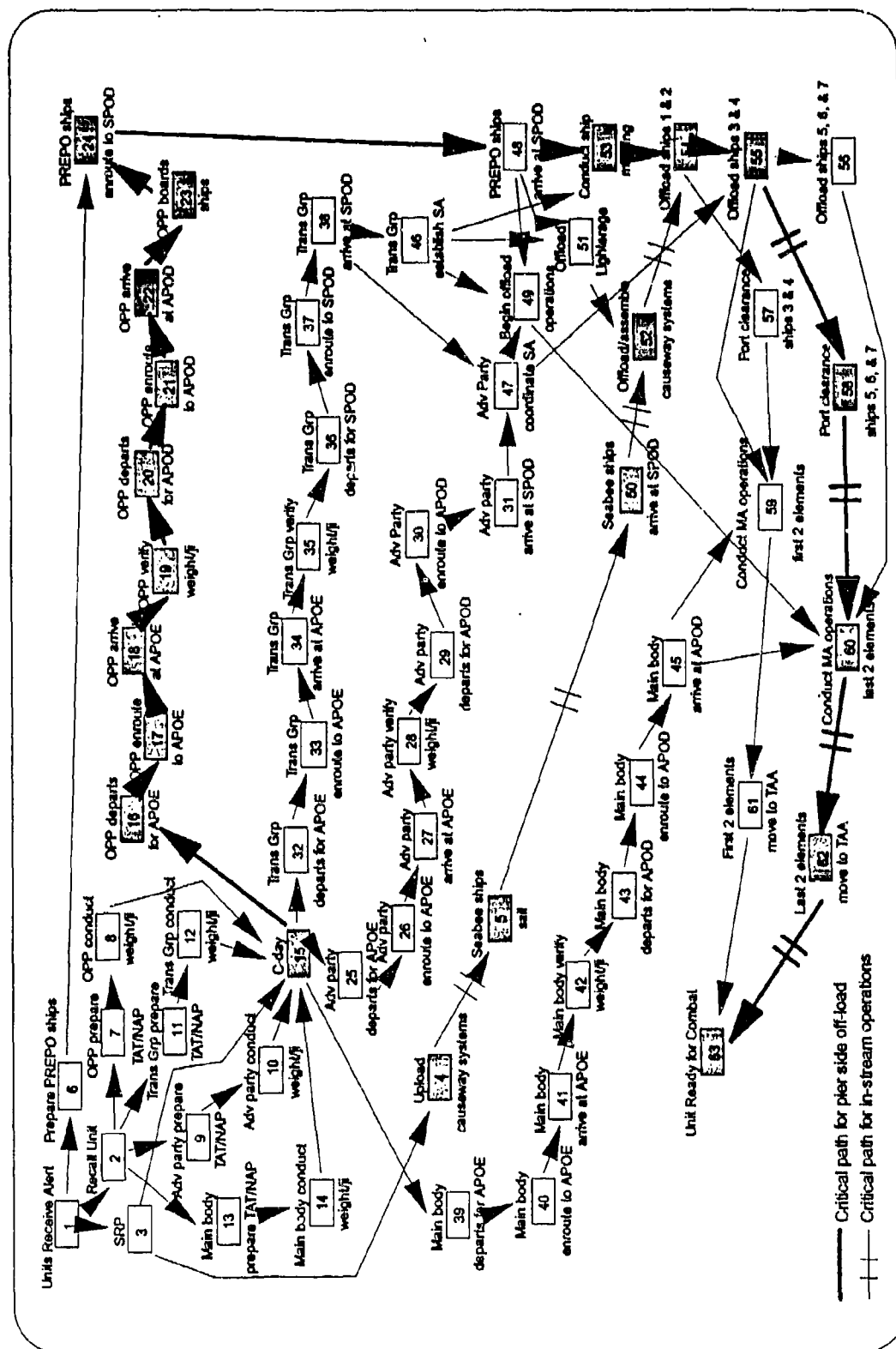


Figure 3. Process diagram of major tasks

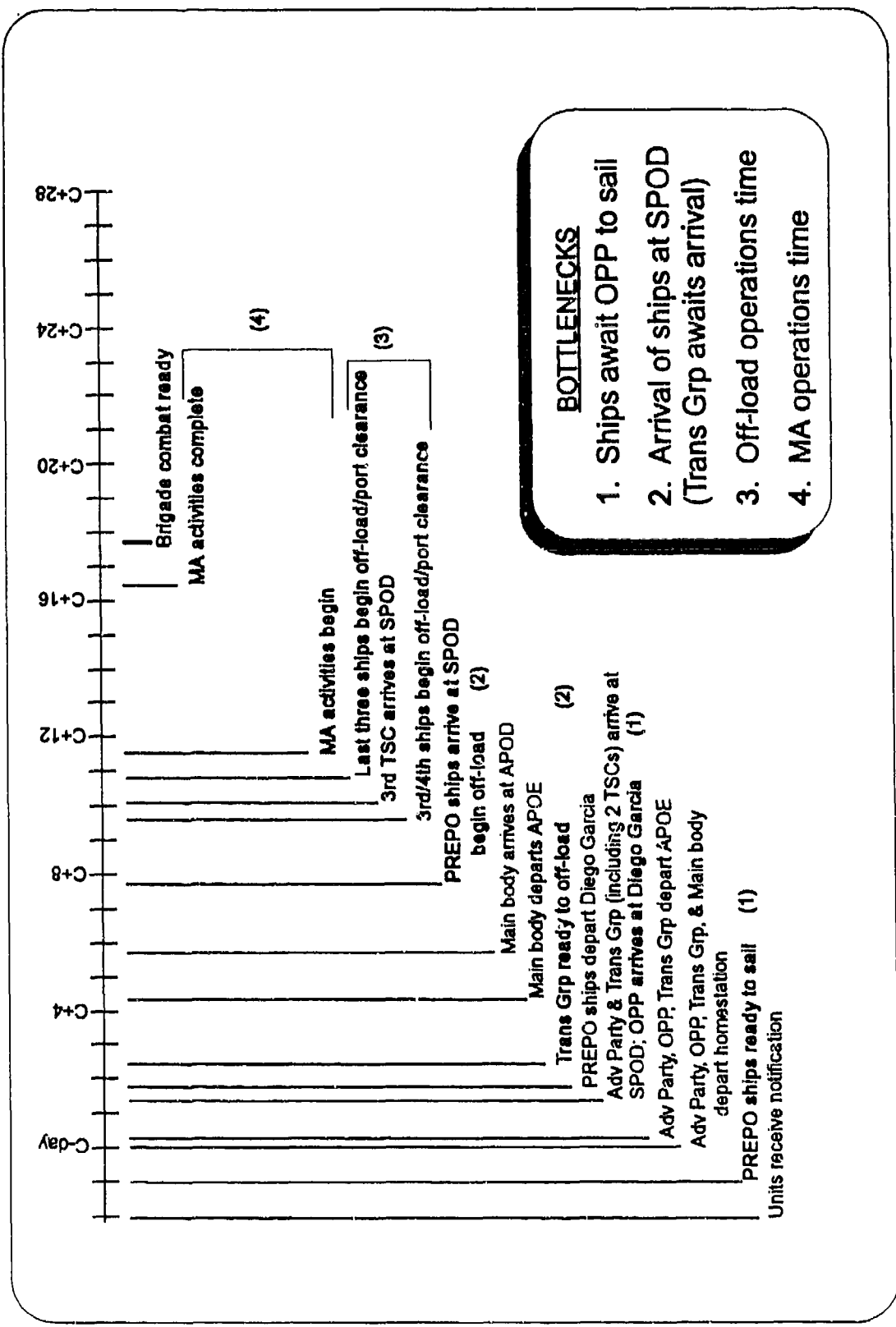


Figure 4. Critical events and duration time of PREPO operations (pier side off-load)

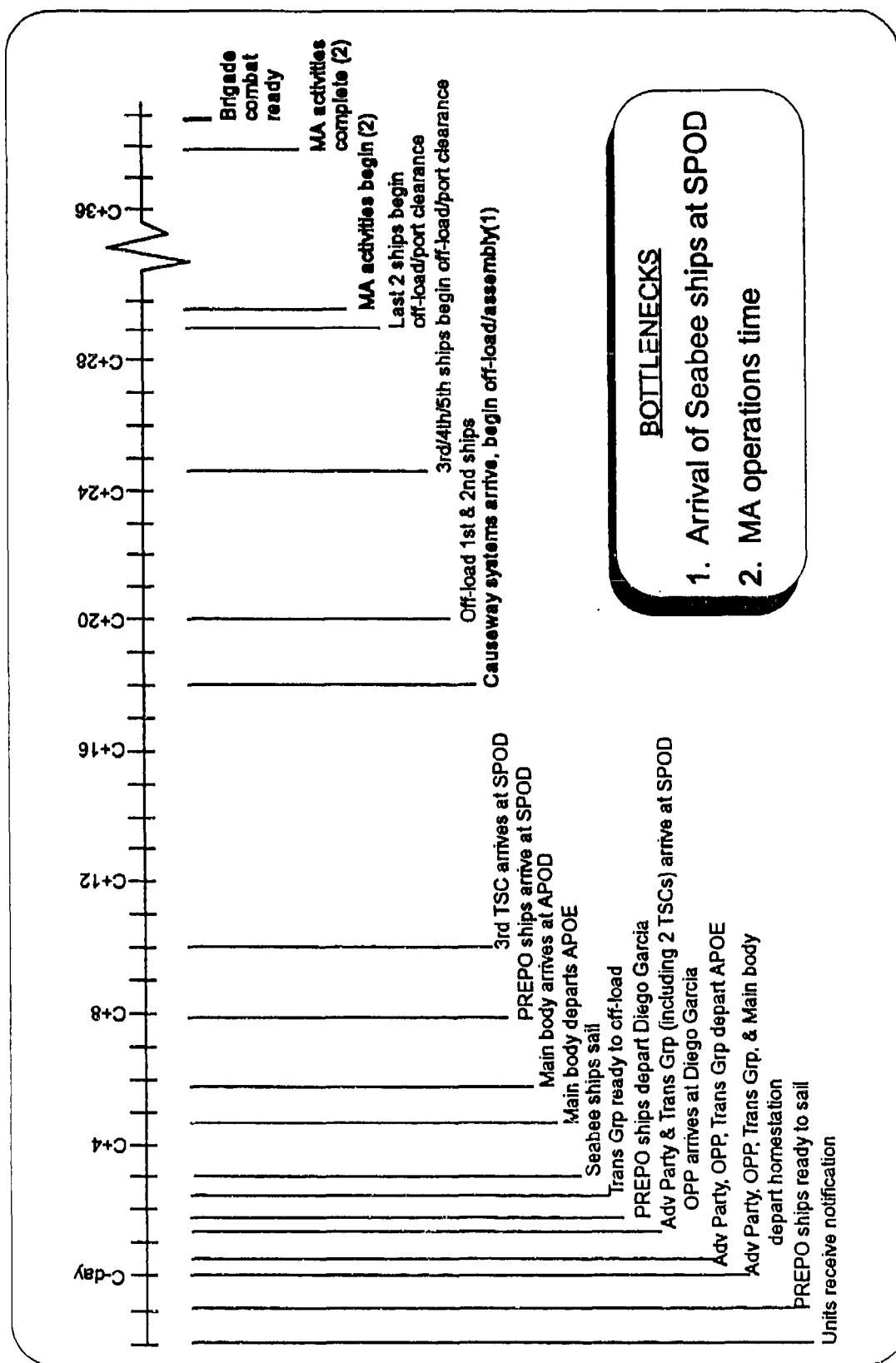


Figure 5. Critical events and duration time of PREPO operations (in-stream off-load)

(2) EEA 6. This EEA was not addressed in this report. Duration times computed by phase, performing unit, and other time groupings identified by the user will be obtainable using the DSS.

(3) EEA 7.

(a) Pier side off-load. The critical path was identified from C-Day even though some tasks occurred prior to C-Day (e.g., soldier readiness processing). As shown in figure 3, the critical path follows the deployment of the OPP, sailing of the PREPO ships, off-loading the PREPO ships, port clearance, and MA operations. Figure 4 shows the timeline of the critical events in PREPO operations with pier side off-loading. Highlighted in the figure are events along the critical path which generate bottlenecks. The bottlenecks indicated on the figure correspond to the numbered event along the timeline.

(b) In-stream (to include LOTS) operations. The critical path follows the sailing of the Seabee ships (which carry the causeway systems), the off-loading and assembling of the causeway systems at the SPOD, and, as in the later portion of pier side off-loading, the off-loading of the ships, port clearance operations, and marshalling area operations. Figure 5 shows the critical events and bottlenecks for in-stream operations.

c. *Issue 3*. The following paragraphs identify recommendations to overcome the bottlenecks and reduce the overall duration time of PREPO operations using pier side off-load or in-stream operations. Considerations are provided which can further impact the duration.

(1) EEA 8 (pier side off-load). The bottlenecks for pier side off-load are shown in figure 6 and the recommendations to overcome the bottlenecks are summarized in figure 7 and discussed in the following paragraphs.

BOTTLENECKS

1. Ships await OPP to sail
2. Arrival of ships at SPOD (Trans Grp awaits arrival)
3. Off-load operations time
4. Marshalling area (MA) operations time

Figure 6. Bottlenecks in PREPO afloat operations (pier side off-load)

These recommendations are decisions a Commander can make to reduce the overall deployment and combat readiness time:

<u>Recommendation</u>	<u>Time Reduced</u>	<u>Combat Ready</u>
1. Deploy OPP prior to C-Day (C-2)	38 hours	C+16
2. Sail ships earlier (C-3) to arrive at SPOD by C+3 (Deploy OPP on C-4)	126 hours	C+13
3. Deploy 3rd & 4th TSC with 1st & 2nd TSC or obtain host nation support for additional TML SVC manpower	36 hours	C+16
4. Reduce MA operations time	24 hours	C+16
Combined recommendations (2, 3, & 4)	186 hours	C+9
Combined recommendations (1, 3, & 4)	98 hours	C+12

Figure 7. Recommendations (pier side off-load)

(a) Deploy OPP prior to C-Day. Deploying the OPP 38 hours earlier (commencing on C-2) enables the ships to sail 38 hours earlier (C-Day). This recommendation would enable the brigade to be ready for combat on C+16 for pier side off-load.

(b) Sail ships prior to C-Day. Preparing the PREPO ships for sea (task 6: **COMPSRON Two Prepares PREPO Ships for Sea**) and sailing the ships (task 24: **PREPO Ships Enroute to SPOD**) four and one-half days earlier (C-3) enables the brigade to be ready for combat by the equivalent amount. This would place the PREPO ships ready to off-load at the same time the transportation group (Trans Grp) is ready to off-load the ships. To accommodate earlier sail time, the OPP must be deployed on C-4. This recommendation does not affect the advance party's tasks. The advance party is prepared to conduct port clearance operations (task 47: **Advance Party Coordinate SA**) by C+3 which, when sailing the ships sooner, is the same time the first two ships carrying maneuver equipment is ready to be off-loaded. This recommendation would enable the brigade to be ready for combat on C+13 for pier side off-load.

(c) Reduce off-load operations time.

- Sending the third and fourth TSCs in sufficient time to commence off-loading the fifth, sixth, and seventh ships by C+9. (The 4th TSC would otherwise be deployed at a later day to off-load equipment for follow-on units and supplies.) This allows four ships to be off-loaded simultaneously. This reduces the time by 36 hours.

- As a planning factor, one TSC off-loads one ship at a time. Operational tests may indicate different planning estimates. The brigade is ready for combat one hour earlier for every hour this time is reduced.

- Obtain host-nation support to assist the Trans Grp in off-loading and port clearance operations. Primarily, additional stevedores (personnel to off-load ships) to off-load additional ships simultaneously would assist the process. Additional stevedores are not needed to assist the TSCs off-load but are needed to off-load additional ships.

(d) Reduce MA operations time. This major task requires 82 hours to complete. In an extreme situation, the brigade can reduce the time to conduct MA operations by 24 hours from 60 hours to 36 hours. This recommendation alone enables the brigade to be ready for combat by C+16.

(e) Combine recommendations. The preceding recommendations can be combined in part or in total; however, this may affect other tasks. For example, deploying the OPP earlier and sailing the ships earlier (recommendations 1 and 2) may force the advance party and/or the Trans Grp to be deployed earlier. The results of two combinations of recommendations are:

- Combine recommendations 2, 3, and 4. Sailing the ships earlier (which encompasses deploying the OPP earlier), deploying the third and fourth TSCs earlier, and reducing the MA operations time results in an overall time reduction of 186 hours. This enables the brigade to be ready for combat on C+9.

- Combine recommendations 1, 3, and 4. Deploying the OPP earlier, deploying the third and fourth TSCs earlier, and reducing the MA operations time results in an overall time reduction of 98 hours. This enables the brigade to be ready for combat on C+12.

(2) EEA 8 (in-stream operations). The bottlenecks for in-stream operations are shown in figure 8 and the recommendations to overcome the bottlenecks are summarized in figure 9 and discussed in the paragraphs below.

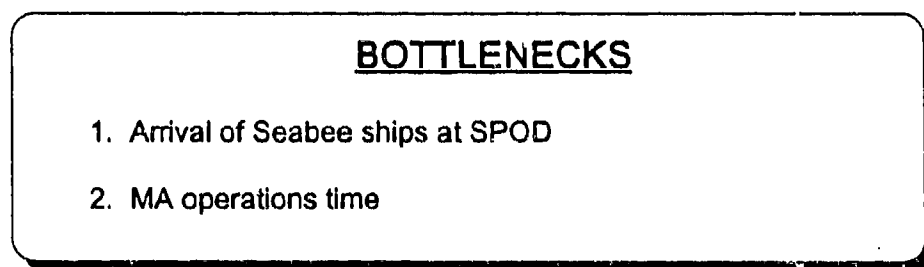


Figure 8. Bottlenecks in PREPO afloat operations (in-stream operations)

These recommendations are decisions a Commander can make to reduce the overall deployment and combat readiness time:

Recommendation	Time Reduced	Combat Ready
1. Sail Seabee ships prior to C-Day (C-9)	12 days	C+26
2. Sail Seabee ships by C-15 & PREPO ships by C-3	15 days	C+23
3. Sail Seabee ships by C-9 & deploy 4th TSC to arrive at SPOD by C+11	16 days	C+22
4. Sail Seabee ships by C-15, sail PREPO ships by C-3, & deploy 3rd & 4th TSCs to arrive at SPOD by C+7	19 days	C+19
5. Reduce MA operations time	24 hours	C+37
Combined recommendations (1 & 5)	13 days	C+25
Combined recommendations (2 & 5)	16 days	C+22
Combined recommendations (4 & 5)	20 days	C+18
Combined recommendations (3 & 5)	17 days	C+21

Figure 9. Recommendations (in-stream operations)

(a) Sail Seabee ships, sail PREPO ships, and deploy TSCs earlier. The Seabee ships carry the causeway systems and additional lighterage from CONUS to the SPOD. The equipment is off-loaded onto the causeway systems (e.g., discharge platforms, causeway ferries) and maneuvered to the port or shore. Sailing the Seabee ships at C-15, sailing the PREPO ships on C-3, and deploying the third and fourth TSCs to arrive at the SPOD by C+7 enables the brigade to be combat ready by C+19. Merely sailing the Seabee ships earlier saves 12 days (C+26). In the study, the Seabee ships arrived after the fourth TSC enabling four ships to be off-loaded simultaneously. Sailing the Seabee ships earlier means they arrive before the fourth TSC. For this reason, it is recommended that the third and fourth TSCs be sent earlier to arrive at the SPOD in sufficient time to off-load four ships simultaneously. Without sailing the PREPO ships earlier, the bottlenecks would then become the same as for pier side off-load.

(b) Reduce MA operations. Reducing the MA operations by 24 hours alone enables the brigade to be ready by C+37. Combining this recommendation with the first recommendation enables the brigade to be combat ready by C+18.

(3) EEA 9. Other factors not considered in this analysis may dramatically impact the duration time of the PREPO afloat operations. Limited space may force staging area operations to be conducted sequentially by battalion and not concurrently. Other factors might include adverse sea states, non-benign POD, loss of a crane, inadequate fuel, time and distance between home station and theater of operation, time and distance between port staging area and unit staging area, etc. These factors will not be modeled in the DSS but should be considered by staff planners.

(a) Doctrinally, PREPO afloat operations enter a theater through a benign port; therefore, load plans are made to maximize the amount of equipment loaded on the ships. The maneuver ships are loaded by battalion. Internal task organization is accomplished during MA operations.

PREPO operations are meant to be flexible to accommodate various contingencies. Each possible contingency operation could dictate a different task organization; trying to load the ships according to task organization provides no gain.

(b) Currently, the Army can not conduct in-stream operations without significant delays. Part of task 51 (**Trans Grp Off-loads Lighterage from HLPS**) is to assemble causeway systems (sub-task noted at appendix B). The causeway systems are not currently fielded or prepositioned. There will be delays for in-stream operations unless the preceding recommendations are made or:

- Causeway systems under development are purchased. This option obviates the delay awaiting Seabee ships to deploy causeway systems. Prototypes of the causeway systems are currently being tested and will not be ready for fielding and prepositioning before FY96.

- Navy causeway systems from one of their maritime prepositioning ship (MPS) squadrons are used. This option is time-dependent based on the availability of Navy assets.

(c) This study assumed host-nation support for tugboats. If the host nation cannot supply sufficient tugboats, the Army tugboats on the American Cormorant ship (an additional ship to the eight (reference task 51: **Trans Grp Off-loads Lighterage from HLPS**)) must be off-loaded *first* during pier side or in-stream operations. (Tugboats are used in pier side off-loading to position the PREPO ships at the pier.) This requires an additional 18 to 24 hours in the PREPO afloat operations.

(d) The auxiliary crane ship is not used in the off-loading process except:

- During in-stream operations.

- When cranes are not sufficiently available to off-load ships in pier side operations.

(e) New ships will replace the interim roll-on/roll-off (RORO) ships currently in place and assumed in this study. The new ships have additional space, thus allowing terminal service assets to be loaded on the maneuver ships. This means the maneuver ships can be off-loaded first instead of the first two support/sustainment ships. These new ships will be phased from fiscal year (FY) 96 to FY02. This allows the maneuver elements to begin MA operations approximately 36 hours earlier. The fact that the newer ships contain more equipment is offset by the fact they contain more discharge points (roll-off points, ramps, etc.), therefore not requiring additional off-load time from that used in this study.

d. *Issue 4.* The DSS is designed to preclude the user from purchasing additional software or hardware. The initial prototype of the DSS will be provided to the EELS BL for comments by the end of May 1994 and the final DSS will be delivered to the CINCs by the end of September 1994. The following paragraphs describe the DSS functionality and software/hardware descriptions.

(1) EEA 10. The DSS will provide menus for the user to select various options. The capabilities of the DSS are listed in the paragraphs below. The capabilities listed below do not reflect the menu design or order. The user's manual, to be distributed with the DSS, will illustrate and describe the menus. The functionality of the DSS is illustrated in figure 10 showing the inputs and outputs.

(a) Editing capabilities. User will have ability to edit data file to add/delete tasks, change tasks, change times, or change sequence of tasks. The user will have the ability to change the assumptions by editing the input data file.

(b) Computing capabilities.

- Compute critical path through all tasks.
- Compute duration times between selected major tasks.

(c) Print capabilities.

- Critical path tasks and time.
- Task list for some or all tasks.
- Gantt chart of tasks and timing.

(d) File storage capabilities. User will have ability to save edited input data file or output files of critical path tasks/times or tasks lists.

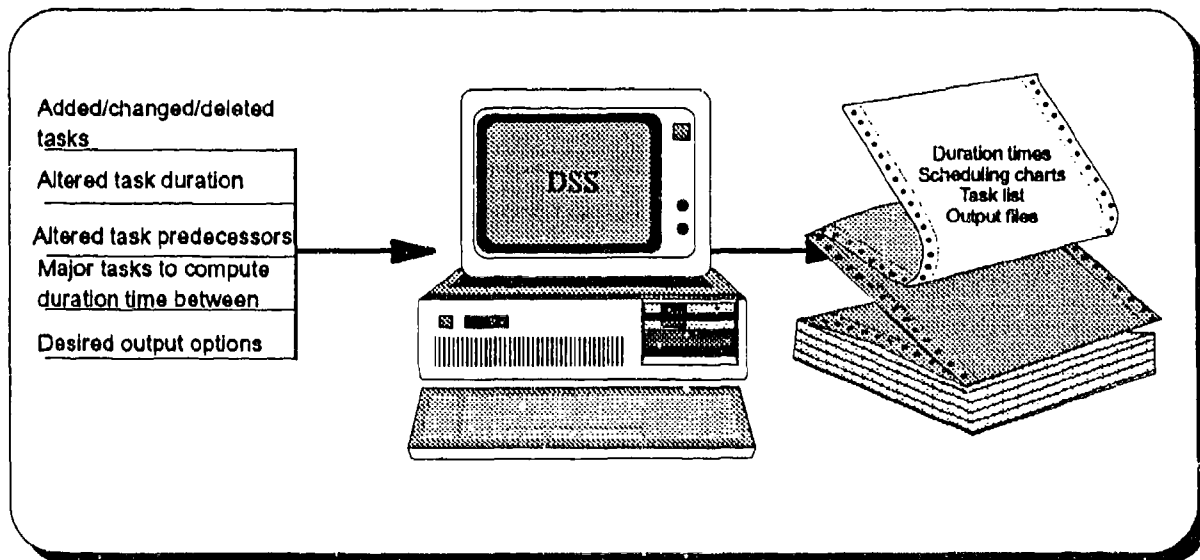


Figure 10. DSS functionality

(2) EEA 11. The user is provided an executable DSS program which obviates the need for a compiler or any software to run the program. The user is also provided a data file which contains the data used in this analysis. The user is given the opportunity to edit/change the data to reflect various contingencies.

(3) EEA 12. The DSS is designed to run on an IBM-compatible personal computer (PC) with disk operating system (DOS). The DSS executable and data file of PREPO tasks and times can be copied onto a floppy disk (maximum density 1.2 megabyte (mb)) or 3.5" diskette (maximum density 1.44 mb).

8. Points of contact. Questions regarding this report or DSS should be directed to: Ms. Lynn Swezy at TRAC-SAC, Ft. Leavenworth, KS; DSN 552-5418; COMM (913)684-5418; FAX 552-3859; or LTC Scott Callender/CPT Dean Hommer at EELS BL, Ft. Monroe, VA, DSN 680-3911/3912; COMM (804)727-3911; FAX 680-5861.

APPENDIX A

JOINT WORKING GROUP (JWG) MEMBERS

BRIGADE PREPO AFLOAT OPERATIONS STUDY

APPENDIX A

JWG MEMBERS

<u>Name</u>	<u>Agency</u>	<u>DSN</u>
Allen, Ken	Military Sealift Command	288-0102
Berkley, LTC Robert	HQ TRADOC	680-4143
Callender, LTC Scott	HQ TRADOC	680-3911
Caroe, CPT Dale	Military Traffic Management Command - Transportation Engineering Agency (MTMC-TEA)	927-5268
Connors, LTC Gerald	HQ TRADOC	680-5855
Cooke, Jack	HQ Forces Command (FORSCOM)	367-6151
Craig, CW3 Tom	U.S. Army Ordnance, Missile & Munitions Center & School (USAOOMCS)	788-2865
Cress, James	USAOOMCS	865-6537
Dallas, COL Michael	HQ TRADOC	680-2620
Dooley, Michael	HHC 24th Infantry Division (G3 Operations)	870-5519
Fraley, CPT Doug	HHC 7th Transportation Group	927-5416
Hamilton, Jessie	U.S. Army Transportation School (USATSCH)	927-2039
Hogg, MAJ David	HQ 1st Cavalry Division (G3 Plans)	727-9345
Holland, MAJ Lee	HQ TRADOC	680-3267
Hommer, CPT Dean	HQ TRADOC	680-3912
Itao, MAJ Peter	TRAC-SAC	552-5418
Ledebuh, Charles	USATSCH	627-6178
Mayton, Ellis	Logistics Support Agency	779-6518
Peterson, MSG Robert	U.S. Army Military Police School	865-3397
Purdue, CPT Tim	HQ U.S. Army Armor Center (USAARMC)	464-3831
Ritter, James	HQ TRADOC	680-5594
Rodgers, LTC Robert	HQ TRADOC	680-3883
Rosewarne, LTC John	Marine Liaison Office	680-2542
Rush, MAJ Robert	HQ Central Command (USCENTCOM)	968-6670
Schmiel, Walt	HQ Depot Systems Command (DESCOM)	570-9936
Sova, Jim	HQ TRADOC	680-3005
Stewart, Jeb	U.S. Army Engineer School	676-7881
Sullivan, CPT Tim	U.S. Army Aviation Logistics School (USAALS)	927-6861
Swezy, Lynn	TRAC-SAC	552-5418
Troutman, LTC Carrick	HQ TRADOC	680-3439
Weiss, Jim	Logistics Management Institute (LMI)	287-2779
Williams, Troy	HQ Third U.S. Army	572-3599

APPENDIX B

PREPO AFLOAT OPERATIONS PROCESSES

BRIGADE PREPO AFLOAT OPERATIONS STUDY

APPENDIX B

PREPO AFLOAT OPERATIONS PROCESSES

Table B-1 contains all the tasks and sub-tasks as identified by the JWG for inclusion in the DSS.

Table B-1. Major tasks/sub-tasks

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
1	UNITS RECEIVE ALERT NOTIFICATION	0 hrs	
1a	Units Receive Alert Notification	0 hrs	
2	UNIT CONDUCTS RECALL OF UNIT	4 hrs	1
2a	Unit Conducts Recall of Unit	4 hrs	1
3	UNIT CONDUCTS SOLDIER READINESS PROCESSING	48 hrs	1
3a	Command Brief	1 hr	2
3b	Pusher Unit Activity (Administrative tasks of unit assisting deploying unit)	5 hrs	1
3c	Family Briefings	2 hrs	1
3d	Draw Zone Clothing	20 hrs	1
3e	Baggage Drop/Load (Drop off/load soldier's bag)	48 hrs	1
3f	Perform Manifest Functions (e.g., verify unit roster)	12 hrs	1
3g	Draw Class I (Rations)	20 hrs	1
#4	TRANS GRP UP-LOAD CAUSEWAY SYSTEMS (NOT PART OF TRANS GRP DEPLOYING) (THIS TASK ONLY FOR IN-STREAM OPERATIONS)	72 hrs	3
#4a	Trans Grp Up-load Causeway Systems	72 hrs	3
#5	SEABEE SHIPS SAIL (CARRYING CAUSEWAY SYSTEMS) (ONLY FOR IN-STREAM OPERATIONS)	15 days	4
#5a	Seabee Ships Sail	15 days	4
6	COMPSRON TWO PREP PREPO SHIPS FOR SEA	22 hrs	1
6a	Commander's Briefing	2 hrs	1
6b	Recall Crews	10 hrs	1
6c	Ensure Stores (Supplies) Onboard	6 hrs	6b
6d	Chart Route	2 hrs	6b
6e	Bring Engine Plant On Line	12 hrs	6b
7	OPP PREPARE EQUIPMENT TAT/NAP	6 hrs	2
7a	Verify TAT/NAP	2 hrs	2
7b	Load Conex (Container) Inserts	6 hrs	2

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
7c	Verify DD Form 1750 (Packing List) and HAZMAT	3 hrs	2
7d	Load Trucks at Unit Area	6 hrs	2
7e	Build Pallets at Airfield	3 hrs	2
8	OPP CONDUCT WEIGHT/JI INSPECTION	6 hrs	7
8a	Weigh Pallets/NAP Vehicles	6 hrs	7
8b	Clean Equipment as Required	6 hrs	7
8c	Maintenance as Required	6 hrs	7
8d	TAT Ammo, Ensure Form -2 is Current	2 hrs	7
9	ADV PARTY PREPARE TAT/NAP	6 hrs	2
9a	Verify TAT/NAP	2 hrs	2
9b	Load Conex Inserts	6 hrs	2
9c	Verify 1750s and HAZMAT	3 hrs	2
9d	Load Trucks at Unit Area	6 hrs	2
9e	Build Pallets at Airfield	3 hrs	2
10	ADV PARTY CONDUCT WEIGHT/JI INSPECTION	6 hrs	9
10a	Weigh Pallets/NAP Vehicles	6 hrs	9
10b	Clean Equipment as Required	6 hrs	9
10c	Maintenance as Required	6 hrs	9
10d	TAT Ammo, Ensure Form -2 is Current	2 hrs	9
11	TRANS GROUP PREPARE TAT/NAP	6 hrs	2
11a	Verify TAT/NAP	2 hrs	2
11b	Load Conex Inserts	6 hrs	2
11c	Verify 1750s and HAZMAT	3 hrs	2
11d	Load Trucks at Unit Area	6 hrs	2
11e	Build Pallets at Airfield	3 hrs	2
12	TRANS GROUP CONDUCT WEIGHT/JI INSPECTION	6 hrs	11
12a	Weigh Pallets/NAP Vehicles	6 hrs	11
12b	Clean Equipment as Required	6 hrs	11
12c	Maintenance as Required	6 hrs	11
12d	TAT Ammo, Ensure Form -2 is Current	2 hrs	11
13	MAIN BODY PREPARE TAT/NAP	24 hrs	2
13a	Verify TAT/NAP	4 hrs	2
13b	Load Conex Inserts	24 hrs	2
13c	Verify 1750s and HAZMAT	6 hrs	2
13d	Load Trucks at Unit Area	12 hrs	2
13e	Build Pallets at Airfield	6 hrs	2
14	MAIN BODY CONDUCT WEIGHT/JI INSPECTION	12 hrs	13

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
14a	Weigh Pallets/NAP Vehicles	12 hrs	13
14b	Clean Equipment as Required	12 hrs	13
14c	Maintenance as Required	12 hrs	13
14d	TAT Ammo, Ensure Form -2 is Current	2 hrs	13
15	C-DAY	0 hrs	3, 8, 10, 12, 14
15a	C-Day	0 hrs	3, 8, 10, 12, 14
*16	OPP DEPARTS FOR APOE	0 hrs	15
*16a	OPP Departs for APOE	0 hrs	15
*17	OPP ENROUTE TO APOE	2 hrs	16
*17a	OPP Enroute to APOE	2 hrs	16
*18	OPP ARRIVES AT APOE	0 hrs	17
*18a	OPP Arrives at APOE	0 hrs	17
*19	OPP VERIFY WEIGHT/JI INSPECTION	3 hrs	18
*19a	Air Force (AF)/HAZMAT Inspection	3 hrs	18
*19b	Rebuild Pallets as Required	3 hrs	18
*19c	Load Aircraft	3 hrs	18
*20	OPP DEPARTS APOE FOR APOD	0 hrs	19
*20a	OPP Departs APOE for APOD	0 hrs	19
*21	OPP ENROUTE TO APOD	30 hrs	20
*21a	OPP Enroute to APOD	30 hrs	20
*22	OPP ARRIVES AT APOD	0 hrs	21
*22a	OPP Arrives at APOD	0 hrs	21
*23	OPP BOARDS PREPO SHIPS	9 hrs	22
*23a	Off-load Aircraft/Transport to Pier	3 hrs	22
*23b	Arrival at Customs	3 hrs	23a
*23c	Transfer OPP Gear to PREPO Ships	3 hrs	23b
*24	PREPO SHIPS ENROUTE TO SPOD	144 hrs	6, 23
*24a	OPP Performs Critical Maintenance in Transit	144 hrs	6, 23
*24b	Match/Validate Load Plans	144 hrs	6, 23
*24c	PMCS for all Vehicles (e.g., check tire pressure, fluid levels)	144 hrs	6, 23
*24d	Fuel Additives	144 hrs	6, 23
*24e	Remove Barrier Tape/Connect Batteries	144 hrs	6, 23
*24f	Start Vehicles	144 hrs	6, 23
25	ADV PARTY DEPARTS FOR APOE	0 hrs	15
25a	Adv Party Departs for APOE	0 hrs	15
26	ADV PARTY ENROUTE TO APOE	2 hrs	25

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
26a	ADV Party Enroute to APOE	2 hrs	25
27	ADV PARTY ARRIVES AT APOE	0 hrs	26
27a	Adv Party Arrives at APOE	0 hrs	26
28	ADV PARTY VERIFY WEIGHT/JI INSPECTION	3 hrs	27
28a	AF/HAZMAT Inspection	3 hrs	27
28b	Rebuild Pallets as Required	3 hrs	27
28c	Load Aircraft	3 hrs	27
29	ADV PARTY DEPARTS APOE FOR APOD	0 hrs	28
29a	Adv Party Departs APOE for APOD	0 hrs	28
30	ADV PARTY ENROUTE TO APOD	30 hrs	29
30a	Adv Party Enroute to APOD	30 hrs	29
31	ADV PARTY ARRIVES AT SPOD	0 hrs	30
31a	Adv Party Arrives at SPOD	0 hrs	30
32	TRANS GRP DEPARTS FOR APOE	0 hrs	15
32a	Trans Grp Departs for APOE	0 hrs	15
33	TRANS GRP ENROUTE TO APOE	2 hrs	32
33a	Trans Grp Enroute to APOE	2 hrs	32
34	TRANS GRP ARRIVES AT APOE	0 hrs	33
34a	Trans Grp Arrives at APOE	0 hrs	33
35	TRANS GRP VERIFY WEIGHT/JI INSPECTION	3 hrs	34
35a	AF/HAZMAT Inspection	3 hrs	34
35b	Rebuild Pallets as Required	3 hrs	34
35c	Load Aircraft	3 hrs	34
36	TRANS GRP DEPARTS APOE FOR SPOD	0 hrs	35
36a	Trans Grp Departs APOE for SPOD	0 hrs	35
37	TRANS GRP ENROUTE TO SPOD	30 hrs	36
37a	Trans Grp Enroute to SPOD	30 hrs	36
38	TRANS GRP ARRIVES AT SPOD	0 hrs	37
38a	Trans Grp Arrives at SPOD	0 hrs	37
39	MAIN BODY DEPARTS FOR APOE	0 hrs	15
39a	Main Body Departs for APOE	0 hrs	15
40	MAIN BODY ENROUTE TO APOE (THIS ENCOMPASSES THE ELAPSED TIME FROM WHEN THE FIRST SOLDIER LEAVES TO WHEN THE LAST SOLDIER ARRIVES)	96 hrs	39
40a	Main Body Enroute to APOE	96 hrs	39
41	MAIN BODY ARRIVES AT APOE	0 hrs	40
41a	Main Body Arrives at APOE	0 hrs	40

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
42	MAIN BODY VERIFY WEIGHT/JI INSPECTION	6 hrs	41
42a	AF/HAZMAT Inspection	6 hrs	41
42b	Rebuild Pallets as Required	6 hrs	41
42c	Load Aircraft	6 hrs	41
43	MAIN BODY DEPARTS APOE FOR APOD	0 hrs	42
43a	Main Body Departs APOE for APOD	0 hrs	42
44	MAIN BODY ENROUTE TO APOD	30 hrs	43
44a	Main Body Enroute to APOD	30 hrs	43
45	MAIN BODY APRIVES AT APOD	0 hrs	44
45a	Main Body Arrives at APOD	0 hrs	44
46	TRANS GRP ESTABLISH SAs	24 hrs	38
46a	Establish Local Security	1 hr	38
46b	Establish Internal Life Support (e.g., establish billeting, dining, fuel)	24 hrs	46a
46c	Establish Communications	4 hrs	46a
46d	Establish Traffic Pattern	24 hrs	46a
46e	Coordinate with PSA	24 hrs	46a
46f	Coordinate with Tanker Airlift Control Element (TALCE) (Coordinate with AF controlling airfields)	6 hrs	46a
46g	Establish Airfield Staging Area	12 hrs	46a
46h	Establish Class V Storage/Issue Site	24 hrs	46a
46i	Establish Class III Storage/Issue Site	24 hrs	46a
46j	Establish HAZMAT Area	24 hrs	46a
46k	Establish Cargo Overflow Area	24 hrs	46a
46l	Establish Vehicle Overflow Area	24 hrs	46a
46m	Establish Container Overflow Area	24 hrs	46a
46n	Establish Vehicle SA	24 hrs	46a
46o	Establish Container SA	24 hrs	46a
46p	Establish Emergency Maintenance Site	24 hrs	46a
46q	Establish Railhead	24 hrs	46a
46r	Establish Inland Terminals (e.g., wheel transportation)	24 hrs	46a
47	ADV PARTY COORDINATE SA	48 hrs	31, 38
47a	Coordinate with In-Country HQ	48 hrs	31, 38
47b	Conduct Reconnaissance of Port, SA, & MA	48 hrs	31, 38
47c	Verify Log Status (Class I - IX)	48 hrs	31, 38
*48	PREPO SHIPS ARRIVE AT SPOD	0 hrs	24
*48a	PREPO Ships Arrive at SPOD	0 hrs	24

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
49	TRANS GRP BEGINS OFF-LOAD OPERATIONS (ONGOING TASK UNTIL MA OPERATIONS COMPLETE)	14 hrs	46, 47, 48
49a	Receive Force Advance Party	14 hrs	46, 47, 48
49b	Establish PSA	10 hrs	46, 48
49c	Establish Lighterage Control Center/Harbormaster	12 hrs	46, 48
49d	Integrate OPP into PSA	1 hr	46, 48
#50	SEABEE SHIPS ARRIVE (ONLY FOR IN-STREAM OPERATIONS)	0 hrs	5
#50a	Seabee Ships Arrive	0 hrs	5
51	TRANS GRP OFF-LOADS LIGHTERAGE FROM HLPS (ONLY FOR IN-STREAM OPERATIONS; HLPS IS AN ADDITIONAL SHIP, NOT PART OF THE EIGHT)	24 hrs	46, 48
51a	Off-load Lighterage	22 hrs	46, 48
51b	Emplace Fendering (i.e., emplace "bumpers" to the ship to prevent metal rubbing against metal)	2 hrs	51a
#52	TRANS GRP OFF-LOAD AND ASSEMBLE CAUSEWAY SYSTEMS (ONLY FOR IN-STREAM OPERATIONS)	48 hrs	50, 51a
#52a	Off-load and Assemble Causeway Systems (on Seabee Ships)	48 hrs	50, 51a
*53	TRANS GRP/OPP CONDUCT SHIP MEETING	1 hr	46, 48
*53a	Trans Grp/OPP Conduct Ship Meeting	1 hr	46, 48
**54	TRANS GRP/OPP BERTH/OFF-LOAD FIRST & SECOND SHIPS	36 hrs (108 hrs)	53, (if in-stream, also 52)
#*54a	Trans Grp/OPP Berth/Off-load First & Second Ships	36 hrs (108 hrs)	53, (if in-stream, also 52)
**55	TRANS GRP/OPP BERTH/OFF-LOAD THIRD & FOURTH SHIPS	36 hrs (108 hrs)	47, 54
#*55a	Trans Grp/OPP Berth/Off-load Third & Fourth Ships	36 hrs (108 hrs)	47, 54
56	TRANS GRP/OPP BERTH/OFF-LOAD FIFTH, SIXTH, & SEVENTH SHIPS (EIGHTH SHIP IS CRANE SHIP AND NOT OFF-LOADED)	36 hrs (108 hrs)	55
56a	Trans Grp/OPP Berth/Off-load Fifth, Sixth, & Seventh Ships	36 hrs (108 hrs)	55
57	TRANS GRP/OPP/ADV PARTY CONDUCT PORT CLEARANCE FOR THIRD & FOURTH SHIPS (ONGOING TASK WHILE 3RD & 4TH SHIPS ARE OFF-LOADED UNTIL LAST PIECE OF EQUIPMENT HAS BEEN CLEARED FROM THE PORT)	56 hrs (128 hrs)	54

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
57a	Stage Equipment at Port SA	56 hrs (128 hrs)	54
57b	Stage Containers at Port SA	56 hrs (128 hrs)	54
57c	Fuel Equipment	56 hrs (128 hrs)	54
57d	Preventive Maintenance Checks & Services (PMCS) on all Vehicles	56 hrs (128 hrs)	54
57e	Accountability of Equipment	56 hrs (128 hrs)	54
57f	Establish Maintenance Collection Point	56 hrs (128 hrs)	54
57g	Recon Routes to MA	56 hrs (128 hrs)	54
57h	Organize Vehicles for Movement - Command & Control (C2) Functions	56 hrs (128 hrs)	54
57i	Road March to MA (Unit Staging Area)	56 hrs (128 hrs)	54
57j	Transport Containers to MA (Unit Staging Area)	56 hrs (128 hrs)	54
#*58	TRANS GRP/OPP/ADV PARTY CONDUCT PORT CLEARANCE FOR FIFTH, SIXTH, & SEVENTH SHIPS	56 hrs (128 hrs)	55
#*58a	Stage Equipment at Port SA	56 hrs (128 hrs)	55
#*58b	Stage Containers at Port SA	56 hrs (128 hrs)	55
#*58c	Fuel Equipment	56 hrs (128 hrs)	55
#*58d	PMCS on all Vehicles	56 hrs (128 hrs)	55
#*58e	Accountability of Equipment	56 hrs (128 hrs)	55
#*58f	Establish Maintenance Collection Point	56 hrs (128 hrs)	55
#*58g	Recon Routes to MA	56 hrs (128 hrs)	55
#*58h	Organize Vehicles for Movement - C2	56 hrs (128 hrs)	55
#*58i	Road March to MA (Unit SA)	56 hrs (128 hrs)	55
#*58j	Transport Containers to MA (Unit SA)	56 hrs (128 hrs)	55

Table B-1. Major tasks/sub-tasks (continued)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
59	UNIT CONDUCTS MA OPERATIONS FOR FIRST 2 ELEMENTS	82 hrs	45, 55, 57
59a	Stage Ammo in Ammo Holding Area	10 hrs	45, 55, 57
59b	Stage Supplies/Rations	48 hrs	45, 55, 57
59c	Stage Equipment	18 hrs	45, 55, 57
59d	Organize Equipment by Unit Sets	18 hrs	45, 55, 57
59e	Establish Load Plans	18 hrs	45, 55, 57
59f	Receive Additional Equipment from Home Station	18 hrs	45, 55, 57
59g	Begin Tactical Operations Prep	18 hrs	45, 55, 57
59h	Purge Equipment (Purge Sights with Nitrogen)	20 hrs	45, 55, 57
59i	Upload Class V	12 hrs	59a
59j	Upload Supplies/Rations	24 hrs	59b
59k	Refuel Operations to Include Bulk	18 hrs	45, 55, 57
59l	Test Fire/Zero Weapons	60 hrs	59h, 59i
59m	Maintenance Operations	18 hrs	45, 55, 57
#*60	UNIT CONDUCTS MA OPERATIONS FOR LAST 2 ELEMENTS	82 hrs	45, 49, 56, 58
#*60a	Stage Ammo in Ammo Holding Area	10 hrs	45, 49, 56, 58
60b	Stage Supplies/Rations	48 hrs	45, 49, 56, 58
60c	Stage Equipment	18 hrs	45, 49, 56, 58
60d	Organize Equipment by Unit Sets	18 hrs	45, 49, 56, 58
60e	Establish Vehicle Load Plans	18 hrs	45, 49, 56, 58
60f	Receive Additional Equipment from Home Station	18 hrs	45, 49, 56, 58
60g	Begin Tactical Operations Prep	18 hrs	45, 49, 56, 58
60h	Purge Equipment (Sights)	20 hrs	45, 49, 56, 58
#*60i	Upload Class V	12 hrs	60a
60j	Upload Supplies/Rations	24 hrs	60b
60k	Refuel Operations to Include Bulk	18 hrs	45, 49, 56, 58
#*60l	Test Fire/Zero Weapons	60 hrs	60h, 60i
60m	Maintenance Operations	18 hrs	45, 49, 56, 58
61	FIRST 2 ELEMENTS MOVE TO TAA	24 hrs	59
61a	First 2 Elements Move to TAA	24 hrs	59
#*62	LAST 2 ELEMENTS MOVE TO TAA	24 hrs	60
#*62a	Last 2 Elements Move to TAA	24 hrs	60

Table B-1. Major tasks/sub-tasks (concluded)

TASK #	MAJOR TASK/SUB-TASK	DURATION in hrs	PREDECESSOR TASKS
#*63	BRIGADE READY FOR COMBAT	0 hrs	61, 62
#*63a	Brigade Ready for Combat	0 hrs	61, 62
<p>Duration for major tasks (highlighted tasks) reflect completion time of all associated sub-tasks. Times in () indicate duration for task when performing in-stream operations. * Indicates task along critical path for pier side off-load # Indicates task along critical path for in-stream (to include LOTS) operations</p>			

APPENDIX C

GLOSSARY/DEFINITIONS

BRIGADE PREPO AFLOAT OPERATIONS STUDY

APPENDIX C

GLOSSARY/DEFINITIONS

ADA	air defense artillery
ADV	advance
AF	Air Force
ammo	ammunition
APOD	aerial port(s) of debarkation
APOE	aerial port(s) of embarkation
AR	armor
bde	brigade
BL	battle laboratory
bn	battalion
bty	battery
C-day	contingency day (this was identified by CENTCOM, 24th Infantry Division, and 1st Cavalry Division as the day when the unit is alerted to deploy)
C2	command and control
CENTCOM	Central Command
CINC	commander-in-chief
CJCS	Chairman, Joint Chiefs of Staff
CM	chemical
co	company
COMPSRON	Commander Maritime PREPO Squadron
CONUS	continental United States
DESCOM	Depot Systems Command
DOS	disk operating system
DSS	decision support system
EEA	essential element(s) of analysis
EELS	Early Entry Lethality and Survivability (battle laboratory)
ENG	engineer
FA	field artillery
FM	Field Manual
FORSCOM	Forces Command
FY	fiscal year
Gantt	horizontal bar chart which specifies the start and finish times for each task on a horizontal time scale

HAZMAT	hazardous materiel
HET	heavy equipment transport
HHB	headquarters headquarters battery
HHC	headquarters headquarters company
HLPS	heavy lift prepositioning ship
HQ	headquarters
hr	hour
ID	infantry division
in-stream operations	off-loading at sea on lighters (causeway ferries or landing craft) which maneuver 1) onto the shore (LOTS) or 2) into a port that is inaccessible to deep draft ships for final off-load. Possible reasons for inaccessible port are: <ol style="list-style-type: none"> 1) Denied port -- the enemy has blocked the channel or has blocked access to the piers, 2) Degraded port -- facilities have been degraded such that the port cannot handle deep draft ships such as the PREPO ships, or 3) Minor port -- port incapable of handling deep draft ships.
JI	joint inventory
JTF	joint task force
JWG	joint working group
LMI	Logistics Management Institute
LO	liaison officer
log	logistics
LOGSA	Logistics Support Agency
LOTS	logistics over the shore
MA	marshalling area [according to FM 100-17-1, it is the geographic location where a deploying unit assembles, holds, and organizes supplies and/or other equipment for onward movement]
mb	megabyte
MI	military intelligence
MLRS	multiple-launch rocket system
MP	military police
MPS	maritime prepositioning ship
MTMC-TEA	Military Traffic Management Command-Transportation Engineering Agency
MX	mechanized
NAP	not authorized prepositioning
NCA	National Command Authorities
OPP	off-load preparation party

PC	personal computer
PERT	project evaluation and review technique
plt	platoon
PMCS	preventive maintenance checks and services
POD	port(s) of debarkation
prep	prepare
PREPO	prepositioned
PSA	port support authority
recon	reconnaissance
RORO	roll-on/roll-off
SA	staging area [according to FM 100-17-1, it is the area inside the marshalling area where combat preparation takes place prior to movement to the TAA]
SIG	signal
SME	subject-matter expert(s)
SOP	standard operating procedure(s)
SPOD	sea port(s) of debarkation
SPOE	sea port(s) of embarkation
spt	support
SRP	soldier readiness processing
TAA	tactical assembly area
TALCE	tanker airlift control element
TAT	to accompany troops
TML SVC	terminal service
TOFM	theater opening force module [a package of port opening and theater-level support assets crucial to opening an area of operations; a terminal service company is contained in a TOFM]
TRAC	TRADOC Analysis Center
TRAC-OAC	TRAC-Operations Analysis Center
TRAC-SAC	TRAC-Study and Analysis Center
TRADOC	Training and Doctrine Command
Trans Grp	transportation group
TR/OM	theater reception and onward movement
TSC	terminal service company
ULLS	unit-level logistics system
USAALS	U.S. Army Aviation Logistics School
USAARMC	U.S. Army Armor Center
USAMC	U.S. Army Materiel Command
USAMMA	U.S. Army Medical Materiel Agency
USAOOMC	U.S. Army Ordnance Missile & Munitions Center and School
USATSCH	U.S. Army Transportation School

APPENDIX D

DISTRIBUTION

APPENDIX D

DISTRIBUTION

	<u>No. copies</u>
Commandant, USAES ATTN: ATSE-CDB-S (Jeb Stewart) Ft Leonard Wood, MO 65473	1
HQ, FORSCOM ATTN: AFLG-POC (Jack Cooke) Ft McPherson, GA 30330-6000	1
HQ, USCENTCOM ATTN: CCJ5 (MAJ Robert C. Bush) MacDill AFB, FL	1
Commandant, USATSCH ATTN: ATSP-TOJ (Jessie Hamilton) Ft Eustis, VA 23604	1
Executive Director, LOGSA ATTN: AMXLS-LLS (Ellis Mayton) Redstone Arsenal, AL	1
Commandant, USATCSH ATTN: DCD (Charles K. Ledebuh) Ft Eustis, VA 23604	1
LMI ATTN: Jim Weiss 2000 Corporate Ridge McLean, VA 22102	1
MTMC-TEA ATTN: CPT Dale Caroe 720 Thimble Shoals Blvd, Suite 130 Newport News, VA 23606	1

MSC	1
ATTN: Ken Allen	
Washington Navy Yard, Bldg 210	
901 M Street, SE	
Washington, D.C. 20398-5540	
 HHC, 7th Transportation Group	 1
ATTN: CPT Douglas Fraley	
Ft Eustis, VA 23604	
 HQ, TRADOC	 5
ATTN: ATCD-L (COL Michael D. Dallas)	
Ft Monroe, VA 23651	
 HQ TRADOC	 1
ATTN: Office of the DCSA (CPT Bradie L. Burson)	
Ft Monroe, VA 23651	
 HQ, TRADOC	 1
ATTN: ATTG-CC (James W. Ritter)	
Ft Monroe, VA 23651	
 HQ, TRADOC	 1
ATTN: ATCD-SL (Jim Sova)	
Ft Monroe, VA 23651-5000	
 HQ, DESCOM	 1
ATTN: AMSDS-WR (Walt Schmiel)	
Chambersburg, PA 17201	
 HQ, USAARMC	 1
Office of Chief of Armor	
ATTN: ATZK-ARR (Timothy Purdue)	
Ft Knox, KY	
 Assistant Commandant, USAALS	 1
ATTN: ATSQ-LCD-C (CPT Timothy S. Sullivan)	
Ft Eustis, VA 23604-5416	
 Commander, USAMPS	 1
DCD/FMD/FI	
ATTN: ATZN-FMD (MSG Robert D. Peterson)	
Ft McClellan, AL 36205	

USMC ATTN: ATFE-MC (LTC John Rosewarne) Ft Monroe, VA 23651	1
Commandant, USAOMMCS ATTN: ATZN-CM-CB (James M. Cress) Battlelab Integration Center Ft McClellan, AL 36205-5010	1
HQ, TRADOC ATTN: ATDO-A (LTC Carrick T. Troutman/LTC Robert Berkley) Ft Monroe, VA 23651	2
USAOMMCS DCD, Munitions Branch ATTN: ATSK-CCU (CW3 Tom Craig) Redstone Arsenal, AL 35808	1
HHC, 24ID G3 Operations (Michael T. Dooley) Ft Stewart, GA 31314	1
HQ, 1st Cavalry Division G2 Plans (MAJ David R. Hogg) Ft Hood, TX 76544	1
Defense Technical Information Center ATTN: DTIC-TCA Cameron Station Alexandria, VA 22314	1
U.S. Army Library Army Study Documentation and Information Retrieval System (ASDIRS) ANRAL-RS ATTN: ASDIRS The Pentagon Washington, D.C. 20310	1
U.S. Army Combined Arms Research Library (CARL) ATTN: ATZL-SWS-L Ft Leavenworth, KS 66027-5000	1

HQ, Third U.S. Army/ARCENT
ATTN: G-4 PREPO (Mr. Williams)
Ft McPherson, GA 30330-7000

1

U.S. Army Concepts Analysis Agency
ATTN: CSCA-TCS (Martin Dwarkin)
8120 Woodmont Ave.
Bethesda, MD 20814-2797

1

TRADOC Analysis Center
ATTN: ATRC-SAS
Ft Leavenworth, KS 66027-5000

20